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CHILDREN'S HOSPITAL

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VOLUME VI NUMBER 1-12

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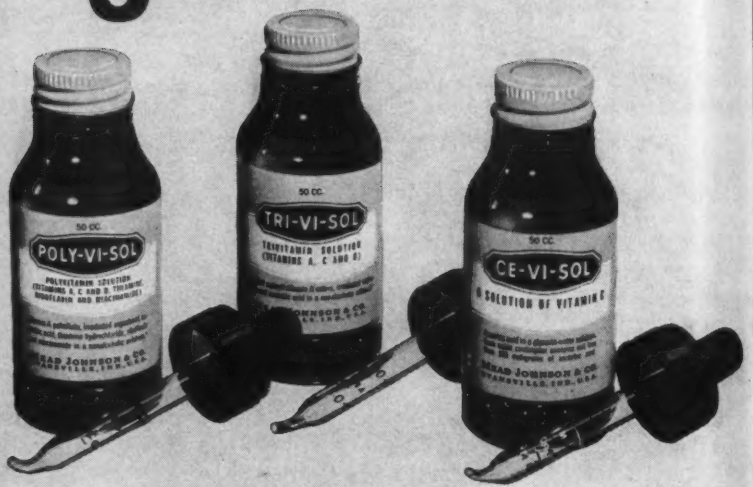

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CLINICAL PROCEEDINGS

OF THE CHILDRENS HOSPITAL

13th and W Streets, Washington 9, D. C.

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H. INFLUENZA MENINGITIS TREATED WITH AUREOMYCIN AND SULFADIAZINE

Case Report No. 166

Elmer O. Bean, M.D. E. B. 49–6069

This two year old colored male was admitted to Children's Hospital on May 13, 1949 with the history of having been well until 3½ days prior to admission at which time he became irritable and had a fever. The following day the fever seemed higher and the patient had a chill and vomited. From then until the time of admission, he had been listless, lethargic, and had taken nothing by mouth except water and orange juice in small amounts. The patient had been seen by a local doctor two days prior to admission, at which time his temperature was 104°F. He was given 300,000 units of procaine penicillin in oil, and on the following day he received a second dose of the drug. It was noted at this time, that his right leg was stiff and that he objected to being touched or moved. When no improvement ensued during the next forty-eight hours, hospitalization was advised.

On admission the patient was a well developed, well nourished colored male who appeared acutely ill. He was very lethargic but cried vigorously with any manipulation of the neck, back, head, or extremities. The temperature was 101.8°F., pulse 140, and respirations 38. There was some injection of the conjunctivae. His tonsils and pharynx were moderately inflamed. There was a marked degree of nuchal rigidity and some spasticity with no apparent weakness of the extremities. Positive Kernig, Brudzinski, and Babinski signs were elicited. The superficial and deep reflexes were moderately hyperactive.

The initial spinal tap showed slightly cloudy fluid with 750 leukocytes per ccm. of which 89 per cent were neutrophiles and 11 per cent lymphocytes. The protein content was 80 mgm. % and a quantative sugar was 5 mgm. %. A smear and typing of the spinal fluid revealed the organism to be H. influenza, type B. After unsuccessful attempts to administer aureomycin orally, the patient was started on the drug in a dose of 1 gram per day in 1,500 milliliters of fluid by continuous intravenous drip together with sodium sulfadiazine by clysis. On the following day, the temperature was normal and the patient reacted to stimuli. However, his general condition remained unchanged. A repeat spinal tap on the second day showed 3,520 leukocytes per ccm. with 94 per cent neutrophiles and 6 per cent lymphocytes. The spinal fluid protein was 80 mgm. % and the sugar, 35 mgm. %.

On the third hospital day, since the patient seemed to be responding, oral aureomycin in a dose of 250 mgm. every four hours was again at-

tempted. However, the patient soon began to vomit and a continuous intravenous drip was again started. Up until this time, the child had intermittent generalized convulsions which were controlled by sodium luminal. Although the patient became rational and answered simple questions, he remained acutely ill. The stiffness and tenderness of the right leg and left arm persisted.

A spinal tap on the fourth hospital day revealed almost clear fluid with a slightly xanthochromic tint. There were 302 leukocytes with 76 per cent neutrophiles and 24 per cent lymphocytes with normal sugar content.

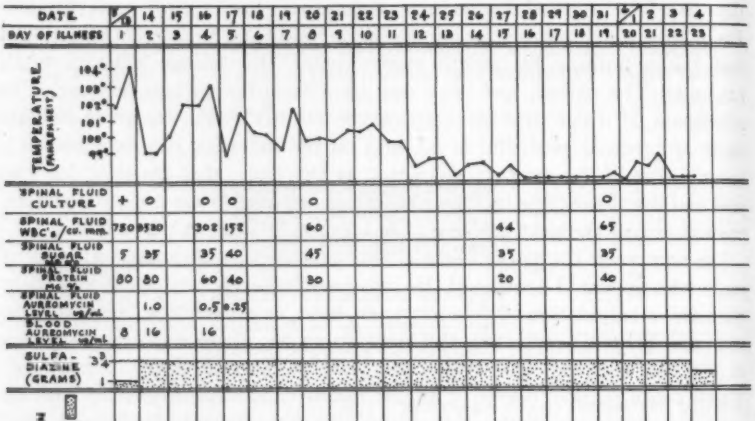

CHART 1.

During the first week of hospitalization, the child's temperature remained elevated between 100 and 103.2°F. However, on the fifth day, he began to improve clinically and following this, the improvement was progressive. A spinal tap on the fifth hospital day revealed 153 leukocytes with 65 per cent neutrophiles and 35 per cent lymphocytes; the protein was 40 mgm. % and the sugar 40 mgm. %.

On the eighth day, the total cell count was 60 with 30 mgm. % protein and 45 mgm. % sugar. No organisms were seen on smear. Aureomycin therapy was discontinued on the eighth day. On the thirteenth hospital day, the patient was able to sit up in a chair for short periods of time and was eating well. Parenteral sulfadiazine was discontinued and the drug was continued orally during the next seven days.

At the time of discharge, twenty-three days after admission, the patient was walking with support, holding up his head more readily and appeared much brighter. There were still signs of meningeal irritation, however, and it was felt that this might well be due to a plastic exudate which had failed to resolve.

The child was seen in Neurology Clinic three weeks after discharge and was noted to have a persistent difficulty in walking. He had no real loss of motor control, but seemed to have a proprioceptive disturbance. The mother stated that he was able to ride his tricycle and could stand alone and that his gait was improving daily. He was seen again three months after discharge and was still seen to have a severe disturbance in gait.

Sidney Ross, M.D.: Current treatment in H. influenza meningitis makes use of combination therapy including streptomycin and sulfa drugs in mildly to moderately ill patients, with the addition of H. influenza antiserum in severely ill patients. Employing this method of management, several series have been reported in which the mortality rate usually ranged from 10 to 20 per cent[1]. This represents a marked reduction in mortality over that of previous years, especially in the infant age group.

In the majority of instances, streptomycin was administered both intramuscularly and intrathecally. Hoyne and his co-workers[2], however, believe that good results in this infection may be obtained without intrathecal therapy if adequate amounts of streptomycin are administered intramuscularly. However, the omission of streptomycin intrathecally has not been universally adopted and must await wider clinical experience before any definite statement is possible. Yampolsky and Jones[3], on the basis of their results in twenty-two cases, believe that H. influenza antiserum is not required in the majority of cases in view of the efficacy of combined streptomycin and sulfadiazine therapy.

The chief drawbacks of streptomycin therapy rest first on the rapid development of resistant strains of organisms and, secondly, on the toxic effects of the drug on the eighth nerve. Because of this, we have largely discontinued the use of streptomycin at Children's Hospital except in cases of tuberculosis meningitis and H. influenza meningitis, and have employed aureomycin or chloromycetin in infections where streptomycin ordinarily would be used. The possibility that aureomycin can be used as a substitute drug for streptomycin in H. influenza meningitis rests on the demonstration of the ready susceptibility of the organism to aureomycin, the lack of development of aureomycin-resistant strains, and the absence of toxicity observed when aureomycin is employed. With this in mind, it was considered of some interest to attempt to manage the present patient on a combination of aureomycin and sulfadiazine. In view of the severity of the infection, it was not deemed advisable to employ aureomycin alone.

The clinical response to therapy in this case was not dramatic. The

temperature remained elevated for approximately ten days following the initiation of combined therapy, and the child remained relatively toxic for approximately five days. Bacteriologically, a more salutory effect was observed. The spinal fluid culture became negative within twenty-four hours after combined aureomycin and sulfadiazine treatment was started and remained negative on four subsequent cultures. The pleocytosis in the spinal fluid similarly showed a prompt response and within one week, dropped from 3520 cells to 60 cells. Similarly, the spinal fluid sugar which was 5 mgm. % rose rapidly to 35 mgm. % within twenty-four hours after treatment was begun. Of interest was the observation that the spinal fluid aureomycin level ranged between 0.5 to 1.0 micrograms per milliliter while the aureomycin blood level varied from 8 to 16 micrograms per milliliter. However, it must be borne in mind that sulfadiazine was being employed simultaneously, and hence, may well have vitiated the accuracy of the aureomycin biological assays both of blood and of spinal fluid.

This patient posed several practical problems in aureomycin administration. Initially, the drug was administered orally but the child was unable to retain it even when gavage was employed. The triad of nausea, vomiting, and diarrhea was one of the disturbing accompaniments of aureomycin administration in about 20 per cent of the patients whom we have treated with this drug during the past year at Children's Hospital. Hence, it was necessary to discontinue the oral mode of administration in this patient and resort to a continuous intravenous drip by means of which a dose of approximately one gram of aureomycin per day was administered. Except for the local thrombophlebitis at the site of the needle, which was probably due to the irritating effects of aureomycin on the vein, no other untoward effects were observed with this method of administration. As is well known, the intramuscular administration of aureomycin is not too feasible because of the marked irritation at the site of injection even when relatively small doses are used. We have employed the intramuscular route in the treatment of bacterial pneumonias in children and have found it to be less efficacious that the oral route. Aureomycin blood levels obtained with the small doses permitted by intramuscular administration would in all probability be inadequate to cope with such a serious disease as H. influenze meningitis.

The contribution made by aureomycin to the recovery of this patient is difficult to evaluate. The potential usefulness of this drug as an adjunct in the therapy of H. influenza meningitis can not be decided on at the present time and will require much wider clinical experience before any categorical statement can be made. However, there remains a possibility that aureomycin could be used to advantage as a substitute for streptomycin in this disease in instances where streptomycin resistant strains have made their appearance and also in cases where eighth nerve involvement has

become apparent. If aureomycin is to be used, it is undoubtedly advisable, at the present state of our knowledge, to employ it in combination with sulfadiazine except, perhaps, in very mild cases in older children.

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ANOMALOUS ORIGIN OF THE LEFT CORONARY ARTERY FROM THE PULMONARY ARTERY

Case Report No. 167

Edwin B. Vaden, M.D.

The purpose of this paper is to present two patients in whom the left coronary artery arose from the pulmonary artery instead of the aorta. In both patients, infants, the diagnosis was made at post mortem examination. This malformation was first described in 1911. Since then thirty cases have been reported in the literature. In only three of the cases was the correct diagnosis made before necropsy but as has been pointed out by several authors, the diagnosis may be suspected from the rather typical clinical course and the electrocardiographic and x-ray findings.

The case reports and discussion follow.

Case #1 D.M. 46-622

D. M., a four months old white female was admitted to this hospital on January 24, 1946 because of failure to gain weight. The mother's pregnancy had been uncomplicated and the infant's birth weight was six pounds eight ounces. She was breast fed until one month of age and then was started upon an evaporated milk formula. Many changes in formula were made because of poor weight gain. The infant cried continuously when awake, and occasionally vomited her feedings. Physical examination revealed an irritable, undernourished infant weighing nine pounds fourteen ounces. The heart appeared enlarged upon examination and a promience over the left hemithorax was noted.

On the fifth hospital day, the patient's breathing became labored and her heart rate was rapid. An apical systolic murmur was heard at this time. She was pale, slightly cyanotic, and cried continuously as though in pain especially after feeding. An x-ray at this time showed a greatly enlarged heart with some disseminated infiltration throughout the right lung. The temperature, which had been normal from the time of admission, rose to 102.0 F. The patient became progressively worse and expired on the seventh hospital day.

Necropsy was performed four hours after death. There were pleural and peritoneal effusions present. The left lung was markedly compressed and atelectatic, and the heart filled most of the left thoracic cavity. It weighed 100 grams, which is approximately four times the average normal weight for this age. The left ventricle was greatly hypertrophied and dilated. Many fibrotic areas were noted throughout the myocardium. The left

coronary artery arose from the sinus of Valsalva of the posterior cusp of the pulmonary valve and then persued its normal course to divide into circumflex and anterior descending branches. The right coronary artery

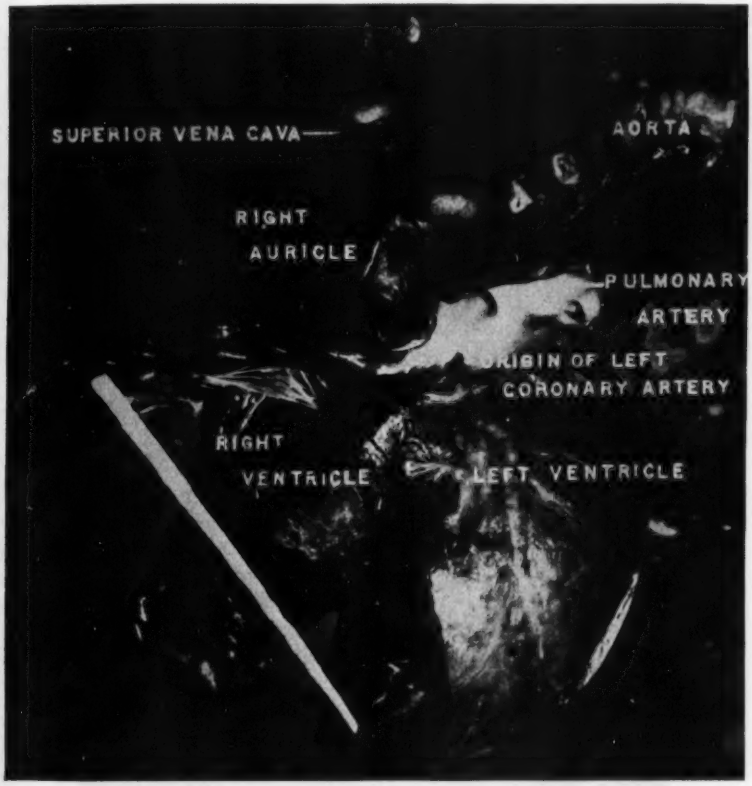

FIG. 1. T. A.

was normal. The liver appeared congested and it extended 4.5 cm. below the right costal margin.

Microscopic examination of the heart showed vacualization and degeneration of the muscle fibers with definite fibrosis and some calcium deposition. The lumen of one small artery was occluded by a thrombus.

Case #2 T.A. 48-8597

T. A., a two months old colored male, was admitted to the hospital because of vomiting and respiratory distress. The mother's pregnancy was

normal. Birth weight was approximately eight pounds. He was breast fed, and his development was satisfactory until one week prior to admission when he began to have fever and hypernea. He was treated for "asthma" without improvement. Shortly before admission he began to vomit his feedings.

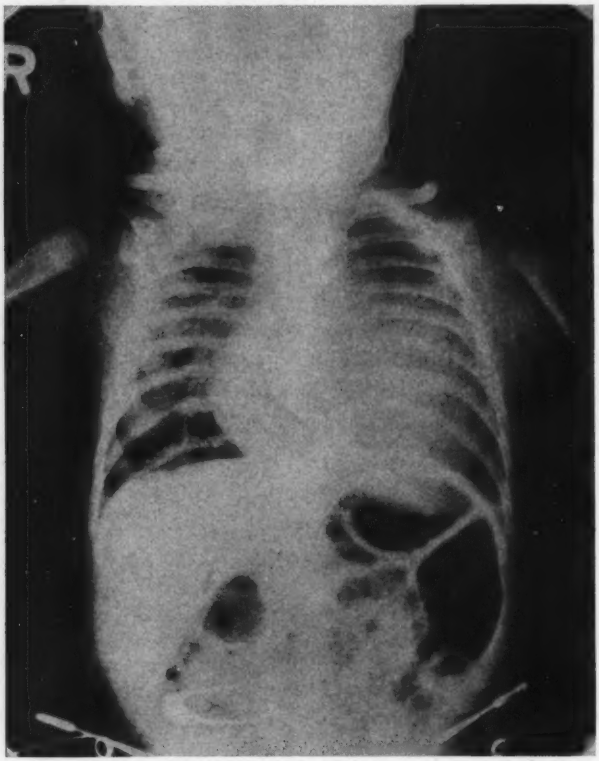

FIG. 2. T. A. Showing characteristic cardiac hypertrophy

Physical examination revealed a well developed and nourished colored male breathing rapidly with forced grunting expiration. The rectal temperature was 101.4 F., pulse 132, and respirations 80. He weighed eleven pounds seven ounces. No other abnormal findings were noted. Shortly after admission his temperature spiked to 105.0 F. and his dyspnea increased. He expired seven hours after admission.

Autopsy was performed fourteen hours after death. The heart was found

to be greatly enlarged to the right and left. It weighed 70 grams, almost three times the normal weight. The left ventricle was dilated to four times the size of the right, and its myocardium was thickened and mottled in appearance. The left coronary artery arose from the pulmonary artery. The right coronary artery had its usual origin and distribution. The ductus arteriosus was closed. There was compression of the left lung. The liver was enlarged. Microscopic examination showed the myocardial fibers to be thinned and separated with an increase in connective tissue between the fiber and about the vessels. The myocardium was congested.

DISCUSSION

The occurrence of an anomalous origin of the left coronary artery from the pulmonary artery was first recorded in 1911 by Abrikosoff. He observed a four months old child who died following an illness of short duration with the clinical diagnosis of pneumonia and pericarditis. At necropsy, the pathologic findings included dilation of the left ventricle, an apical aneurysm, a flattened left anterior papillary muscle, and a low position of the diaphragm. The foramen ovale and ductus arteriosus were closed. The right ventricle appeared to be normal. Microscopically, myocardial degeneration, fibrosis, and calcification were noted in the left ventricle.

In 1946 Kaunitz reported two patients with this malformation discovered at necropsy, and reviewed twenty-five cases found in the literature. Of these twenty-seven cases, twenty infants and seven adults, the anomalous origin of the left coronary artery from the pulmonary artery was the only cardiac abnormality present.

The coronary artery appears as an outpouching endothelial bud in the aortic bulb at about the end of the second week of fetal life. Later the bulbar septum forms to separate the aorta and the pulmonary artery. There are two theories as to the etiology of this anomaly. First, that the cornonary artery anlage arises in the wrong location in the wall of the aortic bulb and second, that the coronary artery anlage arises in the correct position, but the bulbar septum forms in the wrong plane and includes the left coronary artery within the pulmonary artery.

This malformation affects the blood supply to the myocardium. The chambers of the heart are normally formed but the left ventricle is supplied with unoxygenated blood from the pulmonary artery. Judging from the infrequency with which symptoms are noted before two months of age, it would seem that the venous blood entering the left coronary artery is sufficient to maintain some degree of integrity of the myocardium during this period. However, with the increasing demands incident to growth and increased activity, the heart begins to fail. The heart failure produces a stretching of the myocardial fiber because the myocardium is working at the

limits of reserve, there is hypertrophy and a dilatation with consequent reduction in the blood supply and myocardial anoxia. Perhaps the obliteration of the ductus arteriosus, which is usually complete at three months of age, denies the left ventricle of an added amount of oxygen.

In 6,800 consecutive autopsies at Massachusetts General Hospital in thirty-seven years, the lesion was found only once. At Mount Sinai Hospital, 2 cases were encountered among 7,800 autopsies. Abbott found the condition in 10 of the 1000 patients with congenital heart disease reviewed by her.

Lyons states that the majority of patients have died in infancy the youngest at two and one-half months; the oldest, thirteen months. One of our patients, T. A., age two months, is the youngest patient encountered. Four patients have survived to adulthood and in these patients there was always evidence of good collateral circulation. One of these had no symptoms during life and died suddenly of cardiac failure; two others suffered from angina pectoris for a number of years before death.

There is no apparent sex predilection.

The clinical course is usually rather characteristic. The patient is asymptomatic for the first few months of life. From the third to the fifth month, at onset of active motion, he develops difficulty in feeding due to the general debility which results from failing circulation. Dyspnea, pallor, sweating, or a shock-like countenance may be precipitated by the effort of eating. Bland, White, and Garland first called attention to the shock-like state which followed feeding as the outstanding clinical symptom. They attribute the pain to episodes of transient myocardial anoxia.

Cyanosis and clubbing of the extremities are absent since there is no abnormal shunt of blood from the pulmonary to the systemic circulation. Terminally the picture is one of severe cardiac failure with rapid respirations, evidence of pulmonary congestion, and of liver engorgement. At this stage, cyanosis may be present as part of the circulatory failure.

The electrocardiographic findings were considered to be pathonomic. Bland, White, and Garland, who reported the first case with an electrocardiogram, observed T-wave inversion in all three leads, axis deviation, and low voltage curves. Since their report, electrocardiograms taken on four other patients with the anomaly have been reported. Lyon et al obtained an electrocardiogram on both of their pattients. One of these showed inversion of the T-wave in lead I only, with no axis shift or decrease in the Q.R.S. amplitude; the other patient showed inverted T-wave in all leads. One of Kaunitz' patients had an electrocardiogram which disclosed high voltage in leads II and III, RS-T, and T-wave changes characteristic of myocardial anoxia and a tendency toward left axis deviation. Eidlow and Mackenzie published electrocardiogram which showed inversion of the T-waves in

lead I and II with upright T-wave in lead IV and no axis deviation. In general, the changes are those due to myocardial anoxia.

The heart is greatly enlarged in x-ray findings, the enlargement being due to the huge, left ventricle. In the left anterior-oblique position the right ventricle appears slightly enlarged and the left ventricle enormous. Taussig states that fluoroscopy should be expected to show a difference in the force of contraction of the two ventricles.

SUMMARY

Two patients have been presented in whom an anomalous origin of the left coronary artery from the pulmonary artery were found at post mortem. The outstanding features of this malformation are cardiac enlargement and heart failure without murmurs or cyanosis. The onset several months after birth in an apparently healthy infant and the history of pain and symptoms of shock after eating may suggest the diagnosis. The enlargement of the left ventricle as demonstrated by x-ray and fluouroscopy plus the electrocardiographic findings of T-wave inversion in all three leads and low voltage curves aid in making the diagnosis.

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HEMATOCOLPOS WITH IMPERFORATE HYMEN

Case Report No. 168

Alan A. Dun, M.D. B. W. 49–10666

This 12½ year old colored female was hospitalized for a hypogastric mass of two days' duration. Breast enlargement and adult female hair distribution had been present for two years, but she had never menstruated. For six months, she had noted intermittent, midline, crampy, suprapubic pain; increasing in frequency, occurring every other day in the past two months. The pain frequently required bed rest for several months. Decreased urinary output, slight dysuria, and suprapubic discomfort associated with voiding had been present. Hematuria and pyuria were not noted. Mild anorexia occurred for two days prior to admission. Gastro-intestinal symptoms were otherwise absent.

Admission examination revealed a well developed and nourished adolescent with enlarged, soft breasts and adult female hair distribution. The nipples were poorly developed without discharge. Inspection revealed prominence of the lower abdomen. A smooth, semisolid, symmetrical, slightly tender, partially movable mass was noted on palpation 12 cm. above the symphysis pubis. Rectal examination revealed the anterior rectal wall distended by the abdominal mass. The cervix was not palpable rectally. Speculum examination revealed normal external genitalia with a small recess behind the labia. There was a pin point urethral meatus. No vaginal orifice was present.

Routine blood and urine examinations were negative. A flat film of the abdomen revealed a smooth, symmetrical mass rising from the pelvis to the third lumbar vertebra. Pyelography demonstrated slight clubbing of the left calyces and slight dilation of the ureter and renal pelvis, appearing on the four minute film. On the right, no dye appeared until the forty-five minute film. The right calyces were markedly clubbed, and moderate dilation of the pelvis and ureter was noted. A right ureteral kink was present at the level of the transverse process of the third lumbar vertebra. This was considered to be either intrinsic or due to external pressure by the abdominal mass. A barium enema was essentially negative.

Hematocolpos secondary to an imperforate hymen was the pre-operative diagnosis. Excision of a very thick hymen was performed. About one pint of menstrual debris under marked pressure was drained. Culture of the fluid was negative.

The post-operative course was uneventful without fever. There was a small amount of blood genital spotting for three days with no subsequent

discharge. Abdominal pain or urinary symptoms were absent following surgery. The patient was discharged, apparently well on the eighth postoperative day.

FIG. 1. B. W. Note the space-occupying mass in the right flank as pointed out by arrows which proved to be due to hematocolpos.

DISCUSSION

Hematocolpos is infrequently reported in pediatric institutions. The rarity is apparent rather than real due to this age of occurrence in the medical "no man's land" between pediatrics and adult practice. The condition is not uncommon to gynecologists.

The diagnosis is simple to those aware of the condition. The clinical picture is usually clear-cut. The finding of amenorrhea in the adolescent female is immediately suggestive. The most frequent associated symptoms are referable to the urinary tract—dysuria, frequency, nocturia, or retention being present. Abdominal pain (colicky or aching in nature) is usually present, and constipation, although often present, is not prominent. Constitutional symptoms are usually absent.

Careful physical examination makes the correct diagnosis certain. A

cystic, slightly tender, abdominal mass is frequently present. In one review, 38 per cent of cases demonstrated a mass.

Rectal examination localized the abdominal mass. Inspection of the genitalia reveals the vagina not patent. The vaginal obstruction presents itself as a thick, dense sheet of tissue or as a thin, bulging, bluish membrane located at the hymeneal ring or the lower third of the vagina.

The case presented exhibits all the cardinal features of this condition.

The etiology of hematocolpos is almost universally a congenital anomaly. Only scattered cases in the literature are ascribed to synechia from trauma or poor hygiene. Obstruction is usually due to an imperforate hymen, but may be due to atresia of the lower third of the vagina. Dilation may progress from the vagina to involve the uterus and tubes.

The management of this condition is surgical. Simple incision is tempting, but should be avoided, since the wound would close without adequate drainage. A crucial incision is satisfactory for the thin, bulging membrane, but the thick, dense obstruction will usually require excision. Hospitilization is recommended, due to the great potential danger of ascending infection in a dilated genital tract lined with old blood. In one review of 113 cases, there were 6 deaths due to sepsis and 9 cases of pelvic peritonitis. Sterile cultures of the vaginal contents have been routinely requested at the time of operation. Post-operatively, hospitalization for a week is advised with careful perineal hygiene. Subsequently, tub baths amd vaginal examination are avoided until menses have occurred.

Although the diagnosis is usually obvious following conscientious history and physical examination, unfortunate errors in management have occurred in the past. Incision without adequate sterile precautions and facilities, followed by infection and fatality has already been mentioned. Laparotomy for appendectomy has been done on several occasions, the surgeon being misled by abdominal tenderness and a white-count of 20,000. Urethral dilation was repeatedly done on one patient for suspected stricture, prior to recognition that obstruction was secondary to hematocolpos. Some surgeons have advocated surgical removal of the affected organs, arguing that the distorted structures are of no further value. Reported cases almost universally had inadequate follow-up to determine the functional status of the genital tract. There is at least one report of uneventful pregnancy following the correction of this condition. One septic death, following incomplete drainage due to torsion of a dilated fallopian tube, has been reported. Laparotomy was recommended in any cases demonstrating dilation of the genital tract subsequent to hymeneal excision.

SUMMARY

A brief review of the clinical picture of hematocolpos is given and a clas-

sical case presented. The generally accepted management is outlined and the potential errors in therapy are mentioned.

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CRANIOPHARYNGIOMA

Case Report No. 169

Joseph A. Rothschild, M.D. G. G. 49–10331

G. G., a twelve year old white male, was admitted to Children's Hospital on August 20, 1949. The essential features of the history were:

1. Severe occipital headache, continuous for three weeks, but frequent and intermittently present for one year.
2. Non-projectile vomiting of three weeks' duration.
3. Bilateral visual difficulties of one month's duration.
4. Slight lassitude for one year; lethargy for one week.

There was no past history of unexplained fever, convulsions, physical or emotional changes. The mental and school history were normal.

In July, 1949, a tonsillectomy was performed in another hospital, following frequent bouts of tonsillitis. At that time an anemia was found on routine pre-operative laboratory work. A blood transfusion was given. The operative and immediate post-operative course were uneventful.

Upon admission physical examination, a moderately well developed, disoriented child was seen complaining of severe head pain. Opisthotonus was marked. Cyanosis of the extremities was noted. Blood pressure was 88/70; pulse, 60; temperature, 97.0 F.; respirations, 15. Other positive admission physical findings included:

1. Marked nuchal resistance to flexion.
2. Ophthalmoscopic examination revealing atrophic disks and attenuated retinal vessels in the left eye, with papilledema of one or two diopters plus engorgement of the retinal veins and hemorrhages into nerve fiber layer in the right eye. Pupils were normal. Visual field studies were impossible.
3. Tendon reflexes which were generally hypoactive but equal.
4. Pathological reflexes showing unsustained ankle clonus, positive Babinski, Chaddock, and Oppenheim signs on the right. Kernig sign was bilaterally positive.
5. Right facial paresis.
6. Hypalgesia of left side of face and trunk, and of left upper and lower extremities.

During the first day in the hospital, the patient began having generalized convulsions. The cyanosis, hypotension, and slow pulse did not change significantly. X-rays of the skull were obtained. On August 21, the consulting neurosurgical staff decided to operate.

While the patient's head was being shaved preparatory to surgery, with

a sudden change of position, apnea occurred. The apnea was associated with a feeble pulse. A "burr hole" was immediately made at the coronal suture on the left, and a ventricular needle introduced into the cerebrum. The left lateral ventricle was penetrated, and spinal fluid allowed to slowly escape. Spontaneous respiration soon began. A catheter replaced the needle, and with this in place ventriculography was done.

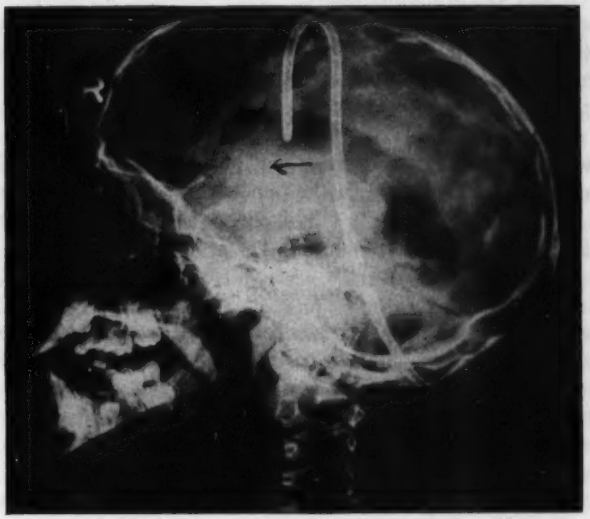

FIG. 1. G. G. Lateral view of the skull showing the hammered silver appearance evidencing increased intracranial pressure. There is a decompression catheter present in the ventricle and the arrows are pointing to the calcified space-occupying mass rising from the floor above the sella turcica. The sella turcica is not well illustrated in this picture.

During the next three days, while waiting for brain edema to subside, a closed suction system was instituted for continuous ventricular drainage.

On August 24, a craniotomy was performed. From a trans-frontal approach a "golf ball" sized tumor was seen arising from below the optic chiasm, stretching the left optic nerve. Several portions of the densely encapsulated mass were removed for biopsy. Suction removed most of the remainder of the tumor, but complete extirpation was impossible. The entire neoplasm was not visualized. A bony decompression under the left temporalis muscle followed.

The catheter remained in place post-operatively. The course was good, orientation being soon regained. No headache was present upon discharge on the seventeenth post-operative day.

On August 16, the patient was seen in the Out Patient Department. Since discharge he had been largely bed-ridden, complaining of weakness and of transient bouts of lancinating frontal headache. There was slight bulging at the point of decompression.

The pathological diagnosis was craniopharyngioma. Pre-operative laboratory work, including complete blood count, urinalysis, and cerebrospinal fluid was within normal limits.

X-rays of the skull before ventriculography demonstrated "beaten silver" appearance of the membranous bones, with separation of the suture lines. These films also revealed suprasellar calcification of brain tissue. The ventriculographs further showed erosion of the anterior and posterior clinoids, and erosion of the sella from above. The upper ventricular system was dilated. The aqueduct of Sylvius was obstructed from view, although a small amount of air was seen in the fourth ventricle. A calcified mass on the floor of the middle fossa (2¼ x 2¼ inches) displaced the third ventricle to the left.

DISCUSSION

The patient presented rather classical general symptoms of increased intracranial pressure from a space-occupying lesion. The first differential diagnostic consideration (before x-rays) was between a brain abscess and a brain tumor. Evidence against the presence of a brain abscess was:

1. Absence of fever and definite focus of infection, although tonsillitis was a possible factor.

2. Focal signs and symptoms present were not those found with the usual location of an abscess.

3. While it is true that a brain abscess may undergo a long dormant period giving rise to few symptoms, the acute phase is characterized, not by signs of an expanding intra-cranial lesion, but rather by an acute febrile response due to rupture of the abscess into a ventricle or to the surface.

4. The x-ray finding of suprasellar calcification was of major importance.

Pituitary adenoma must usually be differentiated from craniopharyngioma. The definitely suprasellar tumor produced few if any symptoms of pituitary damage. In addition, adenomas are rare before fifteen years of age. The x-ray finding of erosion of the sella turcica from above without ballooning of the fossa, plus the findings of calciferous deposits, further served to discard the diagnosis of pituitary adenoma.

Suprasellar endotheliomas must be considered in the differential diagnosis but are rare before the age of thirty. Calcification is not usual. Production of papilledema is a less common finding because of the smaller size of the tumor.

Other diagnoses that required consideration were gliomas of the optic

chiasm and intracranial portion of the optic nerves and the rare tuberculoma of childhood. Still other tumors listed by Escamilla in differential diagnosis are dermoids, cholesteatomas, and chordomas.

It was stated that the finding of suprasellar calcification was of much diagnostic value. This finding is present in more than 75 per cent of craniopharyngiomas, the most common suprasellar tumor of childhood. Intracranial calciferous deposits, even in this area, are not pathognomonic. Indeed, calcified intracranial tissue alone is by no means always pathological. Furthermore, almost any traumatic, inflammatory, neoplastic, hemorrhagic, or degenerative changes of long standing contain deposits of calcium capable of casting opaque shadows. With the clinical picture in this case, however, the finding was certainly revealing.

Craniopharyngiomas occur with a frequency of 6 to 8 per cent of brain tumors in all ages. Many cases occur in childhood, but not a majority. Arising from remnants of the primitive hypophyseal duct; because of embryologic rotation, it is most always situated above the diaphragma sella. It acquires a comparatively large size. The tumor is usually cystic, but may be solid. Microscopically, it resembles either an epidermoid carcinoma or a basal cell carcinoma (adamantinoma type). This case was the basal cell type; a grossly solid tumor, but containing microscopic cysts.

All craniopharyngiomas do not give rise to symptoms. Some remain small; become calcified and stationary. Most give rise to a rather characteristic triad of symptoms:

1. Markedly increased intracranial pressure by displacing the floor of the third ventricle.

2. Visual disturbances due both to increased intracranial pressure with papilledema, and optic atrophy from direct invasion of the nerve, tract, or chiasm.

3. Changes in development and growth from downward pressure on the anterior and posterior pituitary.

Among the rare symptoms are those resulting from pressure on the basal ganglia, brain stem, cerebellar apparatus, and olfactory bulbs.

This child well demonstrates the presence of increased intracranial pressure. Changes in development and growth were not pronounced. The eye findings are most interesting in that the Foster Kennedy syndrome of contralateral papilledema and optic atrophy were present. This is a finding originally described as being associated with frontal lobe tumors, although there are many reports in the literature of the syndrome associated with other tumors; among them, craniopharyngioma.

The treatment Rathke's pouch tumors (craniopharygioma), is generally not satisfactory. Because the damage done by these tumors is due to destruction of important surrounding structures, surgery is the impera-

tive treatment after diagnosis. But the proximity to these vital parts permits only a rare complete surgical extirpation. Nevertheless, conservative evacuation of the cystic type and partial removal of the wall has often provided relief of symptoms for a period of years.

The majority of patients who undergo the more conservative type of surgery have recurrence of symptoms often three to six months afterwards (response to x-ray not predictable). Destruction by X-ray of fluid producing cells of the cyst lengthens the time of recurrence of symptoms. Reevacuation of the cyst is a more efficacious method; likewise, more hazardous. The choice of whether or not to do a second and third craniotomy is largely a matter of response to x-ray, as well as the time interval between recurrence of symptoms.

SUMMARY

A fairly representative case of craniopharyngioma is presented. The major points of differential diagnosis are discussed. The clinical picture and pathology of the tumor are brought out, with principal aspects of treatment. This illustrates that:

1. Recurrent headache demands investigation.
2. Craniopharyngioma is not a rare childhood tumor.
3. Treatment often prolongs life, but is rarely curative.
4. There is a precarious situation with increased intracranial pressure and medullary compression.

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CLINICO-PATHOLOGICAL CONFERENCE

Directed by: E. Clarence Rice, M.D.
Assisted by: Francis J. Troendle, M.D.
William M. Crowell, M.D.
By Invitation: Charles Stiegler, M.D.

Francis J. Troendle, M.D. B. R. 42-8450

A two days old white female baby was transferred to this hospital from Columbia Hospital because of the absence of bowel movements since birth.

Past history reveals a full term new-born with a birth weight of seven pounds, ten ounces, forceps delivery. Family history was non-contributory.

The patient was reported to have failed to pass meconium stools. She regurgitated fluid resembling bile since birth.

Admission physical examination revealed a well developed baby weighing seven pounds, four ounces lying quietly in her crib. The temperature was 100.0 F. Positive findings consisted of a distended abdomen in which no masses were palpable and a rectum which admitted a small rubber catheter a distance of only two inches.

Admission laboratory work revealed a urinalysis to be normal. A flat plate of the abdomen was taken and showed marked distension of the colon as well as some loops of gas-distended small bowel. There appeared to be almost a complete obstruction low down in the gastro-intestinal tract.

The day after admission, gastric lavage was performed and a green-colored fluid with a fecal odor was returned. The baby was taken to the operating room and an ileostomy performed. The small bowel was stated to be dilated down to the ileum. The ileum was filled with what appeared to be dried meconium. The cecum and as much of the large bowel as could be examined was atretic. A Levine tube was passed and Wangonsteen suction instituted following operation and intravenous plasma was given.

Two days post-operatively, the Levine tube was removed and evaporated milk formula was started on the following day. The temperature was 102.0 F. at this time but dropped to normal within twenty-four hours. Meconium-like stools were passed soon after operation through the ileostomy and became soft yellow within two days. They remained so during most of the hospital stay.

The temperature remained normal except for one elevation and the baby tolerated her feedings well until eleven days post-operatively when she began to refuse feedings and regurgitated frequently. Her weight at that time was seven pounds, six ounces. She appeared pale and was transfused with compatible blood. The infant continued to take feedings poorly and

vomited occasionally. She showed a progressive drop in weight to five pounds, four ounces on the fourteenth post-opertive day. On that date she vomited brown-colored material and had four green stools of liquid consistency. She becxme cyanotic suddenly and was placed in oxygen. On the following day the temperature which had been approximately normal since the immediate post-operative period suddenly rose to 103.0 F. and the patient expired.

DISCUSSION

Charles Stiegler, M.D.: In approaching a differential diagnosis of this case, emphasis should be given to the cardinal symptom presented; namely, the absence of bowel movements since birth. This would suggest a complete, congenital intestinal obstruction; the following associated symptoms would support the diagnosis:

1. Increasing abdominal distension.
2. Failure to admit a rectal catheter more than 2 inches.
3. The regurgitation of bile-like fluid since birth.
4. The findings on radiographic examination. The apparent discrepancy between the interpretation of the radiographic findings and the findings at operation could be explained by distended loops of small intestine being mistaken for colon when the film was read.

The post-operative course is compatible with the results of Ladd and Gross in a series of twenty cases in which an ileostomy was performed to relieve an intestinal obstruction; none of the series survived, and this procedure has since been abandoned as a definitive treatment for obstructions. The death of the infant occurred fourteen days post-operatively; the precipitating factor could be a breakdown of the ileostomy with a subsequent peritonitis, complicated by the dehydration and malnutrition secondary to the operative procedure.

In determining the cause of the intestinal obstruction, I have separated the possible courses into an intrinsic and extrinsic group:

A. Intrinsic

1. Aplasia, which is a failure of a segment of the gut and mesentry to develop.
2. Atresia, which is an absence of a segment of the lumen of the intestinal tract. In Ladd's series of fifty-two cases of atresia, thirty-four were present in the ileum.
3. Meconium ileus from inspissated meconium.

All of the above are present at birth, present symptoms early, and are compatible with the symptom picture in this case.

4. Stenosis, either from a segmental narrowing of the intestinal lumen

or from a partial septum. The onset of this symptom picture would be more gradual with less marked obstruction, and the majority of the stenoses are found in the duodenum.

5. Neoplasm of the intestinal wall. The most likely types to explain the findings in this case would be a teratoma or dermoid of the rectum, or a sarcoma of the lower ileum. These would be subjected to the same objections of too rapid onset and too marked an obstruction.

B. Extrinsic

1. Congenital peritoneal bands. These are present at birth, and are most frequently located in the ileocecal region. Included in this group would be cases of intestinal strangulation by vitelline cord remnants.
2. Volvulus.
3. Intussusception.

The age of onset of symptoms, the absence of pain, the lack of blood in the stool, and the operative findings would eliminate these above possibilities.

4. Peritoneal tumors:
   a. Cyst: dermoid, chylous, or serous in origin.
   b. Sarcoma.
   c. Fibroma.

The above are unlikely because of the age of the patient, the mode of onset, and the absence of operative findings.

5. Paralytic ileus, secondary to a general sepsis of peritonitis is ruled out by the absence of any findings to support the presence of a severe infection.
6. Strangulated hernia.
   a. Umbilical.
   b. Inguinal.
   c. Internal, either through a mesenteric defect or diaphragmatic in type.

There are no findings to support these possibilities.

7. Obstruction from an adjacent neoplasm.
   a. Chordoma, arising from embryonic notochord.
   b. Enlarged mesenteric nodes, seen terminally in Hodgkin's disease or lympho-sarcoma, and at a later age period.
   c. Ovarian tumors.
   d. Embryoma of kidney.
   e. Neuroblastoma.

In conclusion I would like to submit the following diagnoses as best explaining the physiopathology in this case.

1. Complete intestinal obstruction due to multiple atresias of the bowel.

2. Inspissated meconium ileus.
3. Immediate cause of death due to break-down of the ileostomy.

PATHOLOGIC DISCUSSION

E. Clarence Rice, M.D.: The body was that of a normally developed, but poorly nourished eighteen day old white female, weight 2,490 grams, length 48.5 cm. A left paramedian incision was present where a right ileostomy had been performed.

The surfaces of both lungs and their adjacent pleurae were covered with a thick fibrinous exudate. No adhesions were found. The left lung was firm and of a blue color. When sectioned, the parenchyma had a variable color, there being a number of red and white areas in a bluish background. The right lung was similar in appearence but not as firm. There was less exudate upon its surface. Microscopically the tissue varied from normal to areas of atelectasis with thickened interalveolar septa, some of the bronchi being clear except for granular material and desquamated epithelial cells. Elsewhere the bronchi were filled with polymorphonuclear leukocytes, round cells, and epithelial cells, the alveoli being obliterated by an exudate of blood and polymorphonuclears. The pleura was thickened and heavily infiltrated with round cells. Abscess formation and lobar pneumonia was evident.

The heart and pericardial sac were normal.

The peritoneum was normal. The liver weighed 160 grams (normal 127 grams). Its surface was dark and the parenchyma congested. On microscopic examination the sinusoids were congested and the polygonal cells poorly defined, there being considerable pigment deposition.

The spleen was congested as were the adrenals and kidneys.

The ileum to a point 58 cm. from the pylorus was filled with a firm green mass which felt like a hard cord. There was severe dilatation of the bowel to the above named point where it was obstructed. Just proximal to this, the bowel had been divided for the ileostomy. A bright green semi-fluid material was present proximal to the obstruction in addition to the cord-like meconium. The colon had a diameter of 5 mm., and was normal except for the small lumen. Microscopic examination confirmed this. The mesenteric lymph nodes were large, firm, discrete, and congested.

The pancreas weighed 3.5 grams and was firm. Microscopic examination revealed rather marked fibrosis with reduction in the number of acini and dilatation of the ducts which were filled with pink-staining secretion. The islets were normal. Portions of the gland were infiltrated with lymphocytes and neutrophilic and eosinophilic polymorphonuclear leukocytes.

The remainder of the examination revealed nothing significant.

Pathologic diagnoses:

Multiple abscesses of the lungs.
Lobar pneumonia.
Secondary atelectasis.
Fibrinous pleurisy.
Cystic fibrosis of the pancreas.
Meconium ileus.
Underdeveloped colon (microcolon).
Post-operative ileostomy.
Hepatic degeneration.
Malnutrition.

Failure of a newborn infant to have bowel movements and the regurgitation of bile would naturally make the physician consider the causes of intestinal obstruction in the newborn. The fact that a catheter could be introduced for a distance of but two inches and the report of the roentgenologist that the colon was distended pointed to an obstruction of the large bowel and apparently ruled out the stenoses and atresias which are found at higher levels. A volvulus or constriction of the bowel by a band could not be ruled out. If a history of pancreatic fibrosis in a sibling had been obtained, this diagnosis could have been strongly entertained. We have recently diagnosed through necropsy two other newborn infants with fibrosis of the pancreas and duct dilatation. One of these was associated with pyloric stenosis and it was only after this was successfully operated on that the baby began to have symptoms which are associated with cystic fibrosis of the pancreas. The pulmonary findings in this case under discussion were probably secondary to aspiration of vomited material. The typical pulmonary findings of this disease, viz., emphysema, atelectasis, multiple abscesses, bronchiectasis with excess secretion of thick mucus had not sufficient time to manifest themselves.

F. R. Leyva, M.D.: The association of organic intestinal atresia and cystic fibrosis of the pancreas was reported by Anderson in 1938, but its occurrence was not clearly understood at that time. Recently, however, Zuelzer reported another case with this condition and clearly demonstrated that this type of atresia is secondary to intra-uterine impaction of meconium with subsequent necrosis of the mucosa, fibrosis, and obliteriation of the lumen. The presence of normally developed muscle layers of the bowel at the site of the atresia, as this case shows, seems to exclude a primary developmental atresia of the bowel because in the latter, the muscle layer is entirely absent. This type of intestinal atresia is only infrequently encountered in combination with meconium ileus, probably because the changes

in the pancreas in utero are not sufficiently advanced in most cases of meconium ileus. In conclusion, this case seems to represent not a primary atresia of the bowel but one secondary to meconium ileus in turn due to cystic fibrosis of the pancreas.

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